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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/823,195	03/29/2001	Xiao-An Zhang	10010538-1	1230

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HEWLETT-PACKARD COMPANY  
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EXAMINER EVERHART, CARIDAD	
ART UNIT 2891	PAPER NUMBER

DATE MAILED: 10/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/823,195

Applicant(s)

ZHANG ET AL.

Examiner

Caridad M. Everhart

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-8, 11, 12, 15, 16, 18-23, 26-28, 31, 32, 35, 36 and 38-40 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 9, 10, 13, 14, 17, 24, 25, 29, 30, 33, 34, 37 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

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Applicant's arguments with respect to claims 1-3,6-8,11,12,15,16,18-23,26-28,31,32,35,36, and 38-40 have been considered but are moot in view of the new ground(s) of rejection.

***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-2,15,and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Gimzewski, et al. (US 6,031,756) in view of Michl et al (US 6,628,016B2).

Gimzewski, et al disclose a molecular switch (col. 5, lines 1-2 and col. 13, lines 22-25). The molecular switch switches conformation (col. 13, lines 15-22) and has electronic states that can differ(col. 4,lines 45-50) in their potential energy and the potential energy diagram is characterized by potential minima(col. 3, lines 4-12). It can be seen in Fig. 3 that the molecule has extended conjugation. Fig. 3 also shows that there are bonds around which the molecular groups can rotate. The application of an electric field brings about the switching(col. 3,lines 25-30) and the application of a voltage brings about the switching(col. 12, lines 65-67 and col. 13, lines 1-3). The substrate 4 shown in Fig. 5b can have electrodes (col. 13, lines 1-7) between which are attached the molecules. In Fig. 5c the molecular switch is shown between two surfaces, the substrate and actuators(col. 11, lines 2-8). The molecular switches have groups that can rotate around bonds(col. 9, lines 62-67). Fig. 1b and Fig. 1c indicate that there can be stretching of bonds as one of the changes. Fig. 5c shows the molecular

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switches sandwiched between electrodes 4 and 31 through which a voltage is applied to the molecular switch layer(col. 13,lines 1-7). Among the uses of the molecular switches are in data storage(col. 13, lines 22-25), which would include memories.

Gimzewski et al is silent with respect to the change of energy gap which comes about by the change in extended conjugation.

Michl et al discloses a molecular switch (col. 9, lines 15-20 and col. 17, lines 64-67). Michl et al discloses that the rotor of the molecular switches can have extended conjugation(col. 7, strucutes 11-14), and that the substituents of the aromatic groups of the rotor can have charges as instrucure 14. The application of electric field would result in changes in the conjugation which would depend upon the polar groups which are attached to the aromatic groups.

It would have been obvious to one of ordinary skill in the art at the time of the invention that the change of conjugation as taught by Michl et al could be applied to the molecular switch taught by Gimzewski et al because Michl et al teaches that the rotors taught by Michl et al is an improvement.

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 3,6-8,11,12,16,18, 19, 21-23,26-28,31-32,35,36, and 38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gimzewski, et al. in view of Michl et al as applied to claim 1 above in view of Heath, et al (US 6,198,655B1).

Gimzewski, et al in view of Michl et al is silent with respect to the recited limitations of the claims with respect to the first and second states and the relationship to the rotor portion and with respect to the junction as recited in the claims.

Although Gimzewski et al in view of Michl et al is silent with respect to the details recited in the claims, it would have been obvious to one of ordinary skill in the art at the time of the invention from Fig. 3 and relating Fig. 3 to Fig. 4a and Fig. 4b that there are rotor portions of the molecule as shown in Fig. 3 and labeled 3 in the figure and that Fig. 4a and 4b show the minima and the maxima in the energy of the molecule with the conformation changes. In addition, the molecule has extended conjugation as shown in Fig. 3, and that this can also be a mechanism of raising the molecule to an excited state(col. 3,lines 25-28), as is well known in the art that there can be pi-bond breaking and forming as part of the conformation changes.

With respect to the dimensions recited, it would have been obvious to one of ordinary skill in the art at the time of the invention to have chosen the dimensions, because these are variables of the art, and nanometer dimensions are known in the art in the formation of memory devices and because Gimzewski et al disclose that the dimensions of the devices are larger than individual molecules(col. 4,lines 50-57).

Heath, et al is relied upon as discussed in the Office Action of 11-15-2004 for its disclosure of the formation of a junction using a molecular switch.

It would have been obvious to one of ordinary skill in the art at the time of the invention that the molecular switch taught by Gimzewski et al in view of Michl et al could be used in the connection of a junction such as that taught by Heath, et al and that the

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dimensions using the molecular switch taught by Gimzewski et al in view of Michl et al could be in the order of nanometers because one of the improvements over the prior art disclosed by Gimzewski et al is that the size using the molecular switch taught by Gimzewski et al can be larger than that of the prior art of record.

***Allowable Subject Matter***

Claims 4,5, 9,10, 13,14,17,24,25,29,30,33,34, and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
CARIDAD EVERHART  
PRIMARY EXAMINER

C. Everhart  
10-17-2005